Report of the banana collecting mission to the province of West New Britain (WNB), Papua New Guinea, from September 30th to October 12th, 2019

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Front page photo credit: G. Sachter-Smith (Peter Talele stands below a bunch of WNB063 'Pagal', edible diploid AA). **Below:** a sample of the diversity of bananas collected in West New Britain.

The collecting team in Kimbe (from left to right): J. Paofa, P. Talele, J. Sardos, E. Togabalaguguwa, M. Lebong, G. Sachter-Smith, C. Gaiba and J. Tvu.

Introduction

Papua New Guinea is home to hundreds of cultivated bananas as well as many banana crop wild relatives. Four collecting missions organized in 1988-1989 yielded the collection of 264 accessions, of which 86% were unique (Arnaud and Horry, 1997). In 2016, a fifth banana collecting mission was organized in the Autonomous Region of Bougainville (AROB) that could not be visited during the 1980's. The collecting mission to AROB resulted in 61 accessions collected, of which nearly 40 were new genotypes (Sardos et al. 2018). The results of the collecting mission to the AROB showed that unique diversity of bananas was still to be found in the country.

In 2019, the Crop Trust funded a campaign of three banana collecting missions to the Pacific Island Countries. It was a good opportunity to visit a still unexplored region of Papua New Guinea. Therefore, after Cook Islands and Samoa, we report here the third 2019 banana collecting mission that occurred in the West New Britain (WNB) province of Papua New Guinea (Fig. 1).

The WNB province is located on the island of New Britain which is the largest island of the Bismarck archipelago. Like many other islands of the region, New Britain was mostly formed by volcanic activity. As a result, six volcanoes or volcano groups are still active on the island. It should be noted that Ulawun's last eruption, on October 1st 2019, hampered exploration of the north-east coast beyond Sulu.

The Bismarck archipelago is of historical importance for Pacific Island Countries as it is the motherland of the Lapita people, who are believed to be the ancestors of most of the modern Oceanic cultures. Nowadays, people of New Britain practice the form of subsistence agriculture dominant to the region based on the vegetative propagation of crops, including bananas. Starting in the late 1960's, oil palm plantations were implanted along the north coast of WNB following several modalities. In one of them, blocks of land were created and leased to smallholders (Elahi and Michael, 2017). Consequently, families from other regions of the island and of the country settled on the North Coast of WNB, creating interesting connections to a wide range of Papuan areas.

Collecting team:

- Ms. Janet Paofa, Food Crop Collection Curator (NARI - Laloki)
- Dr. Julie Sardos, Genetic Resources Scientist (Bioversity – Montpellier)
- Mr. Gabriel Sachter-Smith, Banana Taxonomy Expert (consultant for Bioversity – Montpellier)
- Mr. Ezrah Togabalaguguwa, Food Crops Officer (Department of Primary Industries – Kimbe)
- Mr. Peter Talele, Field Assistant (DPI – Kimbe)
- Mr. Joe Tou, driver (DPI – Kimbe)
- Mr. Chris Gaiba, driver (DPI – Kimbe)

ITC team:

- Dr. Nicolas Roux, ITC manager (Bioversity International)
- Ms. Ines Van den Houwe, ITC curator (Bioversity International)
- Ms. Els Kempenaers, Research Technician (KU Leuven)
- Ms. Annick De Troyer, Research Technician (Bioversity International)

- Dr. Bart Panis, Senior Scientist (Bioversity International)

MGC team

- Prof. Jaroslav Dolezel: Head of the Laboratory of Molecular Cytogenetics and Cytometry (IEB)
- Dr. Eva Hribova: Scientist (IEB)
- Dr. Jana Cizkova: Scientist (IEB)

Supporting teams:

We are grateful to Mr. Mark Lebong, DPI agriculture advisor in Kimbe, for organising successfully the logistics in the field. Our warm thanks also go to Ms. Corine Loiseau and Ms. Roselyn Winston in Bioversity Montpellier and NARI-Laloki respectively, for their support in the administrative set up of the mission. Finally, we acknowledge all farmers who kindly accepted to provide their plant material and to answer our questions.

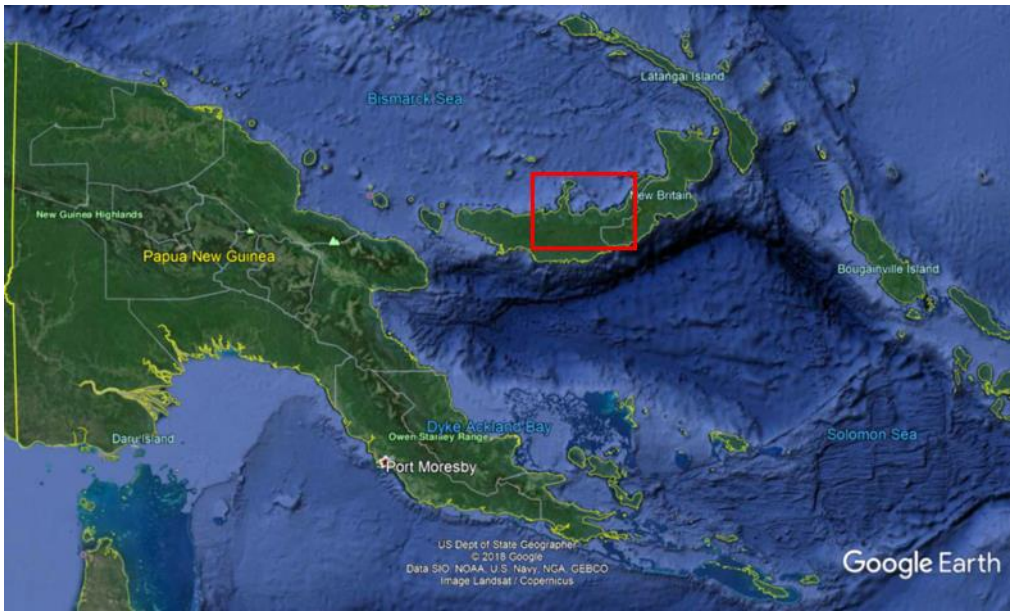

Figure 1: Map of Papua New Guinea. The region visited is highlighted by a red square.

Expedition organisation:

- Day 1 (Sunday 29 of September): Visiting scientists arrive in Port Moresby
- Day 2 (Monday 30 of September): Visit to Conservation & Environment Protection Authority (CEPA)
- Day 3 (Tuesday 1st of October): Travel to WNB (Hoskins airport and then settled in Kimbe).

- Day 4 (Wednesday 2nd of October): Visit Ismine village.

- Day 5 (Thursday 3rd of October): Exploration along inland road east towards Ubai, Silango and until Uasilau.

- Day 6 (Friday, 4th of October): Exploration along the inland road east in direction of Ubai and then south before Lavege to reach Melnge.

- Day 7 (Saturday 5th of October): Exploration along the coastal road east until Valoka.

- Day 8 (Sunday 6th of October): Exploration along the north road until Wangore.

- Day 9 (Monday 7th of October): Exploration of a few food gardens around Hoskins and visited the DPI Food Security Station.

- Day 10 (Tuesday 8th of October): Preparation of suckers and fresh leaf samples for shipments to NARI and MGC respectively.

- Day 11 (Wednesday 9th of October): Shipment of suckers to NARI (by Air Cargo) and of fresh leaf samples to MGC (by DHL). Exploration around Kimbe.

- Day 12 (Thursday 10th of October): Exploration of some of the oil palm plantation blocks in the vicinity of Kimbe; preparation of the last suckers and leaf samples for shipment.

- Day 13 (Friday 11th of October): Shipment of the last suckers and fresh leaf samples to NARI-Laloki and MGC respectively; packing

- Day 14 (Saturday 12th of October): Travel out of WNB

For security reasons, we travelled in two cars when outside of Kimbe. DPI-Kimbe kindly made an extra car available from Day 4 (Wednesday 2nd of October) to Day 9 (Monday 7th of October) (Fig. 2).

Figure 2: Two cars to travel out of Kimbe vicinity.

Methods

The goal of the collecting mission was to enrich the banana national collection located in NARI-Laloki station. Therefore, suckers from all banana cultivars and banana wild relatives that were not already in the collection were collected. Taking advantage of this mission, we also collected accessions that needed to be replaced. Whenever possible, three suckers were collected for further planting. All cultivars and wild relatives collected were documented with passport data (date, place, GPS coordinates, name, classification based on morphology, meaning of name, origin and uses) and descriptive photographs were taken. Fresh cigar leaves were collected to send to the *Musa* Genotyping Centre (MGC) in Czech Republic for flow cytometry analyses and SSR genotyping. We also collected squares of young leaves that were then dried in silica gel and conserved as back-up material.

Figure 3: Collecting process. a. Identification of desirable cultivars; b. collection of suckers; c. collection of leaf samples for further molecular analysis and d. Photo documentation and collection of passport data.

At the end of the mission, the suckers were cut down, bleach cleaned (1:10) to avoid pests and rinsed. They were then left to dry overnight before being wrapped in clean newspapers and packed for shipment to NARI-Laloki by air cargo (Fig. 4). Once arrived in NARI-Laloki, a technical team placed them in the nursery for acclimation (Fig. 5). They will be then planted in the field collection for conservation. In 2020, backups of these accessions will be shipped to Bioversity's International *Musa* Transit Centre (ITC).

Figure 4: Cut and cleaned suckers drying before shipment to NARI-Laloki.

Figure 5: Accessions collected in WNB planted at the nursery in NARI-Laloki.

Results

In total, the team collected 72 accessions, of which 62 seemed to be new or new variants of known genotypes. The results are presented here as a summary of the diversity collected and a detailed catalogue will be published later (Sachter-Smith et al. *in prep*.). Locations of collecting points are presented in figure 6. We also provide at the end of this section two tables of the accessions collected. Table 1 includes collecting dates and locations, codes, names and classifications of the accessions collected along with the results of the flow cytometry analysis when available. It should be noted that

due to the high number of diploid accessions cultivated, practices in PNG favoured situations where cigar leaves were not available for sampling. To ensure a good yield, diploids are indeed replanted at each cultivation cycle. This practice favours the production of “sword suckers” which produce leaves mainly composed of midribs and with very narrow lamina. Table 2 displays the meanings of the accessions’ names, the uses associated and the GPS coordinates for each accession.

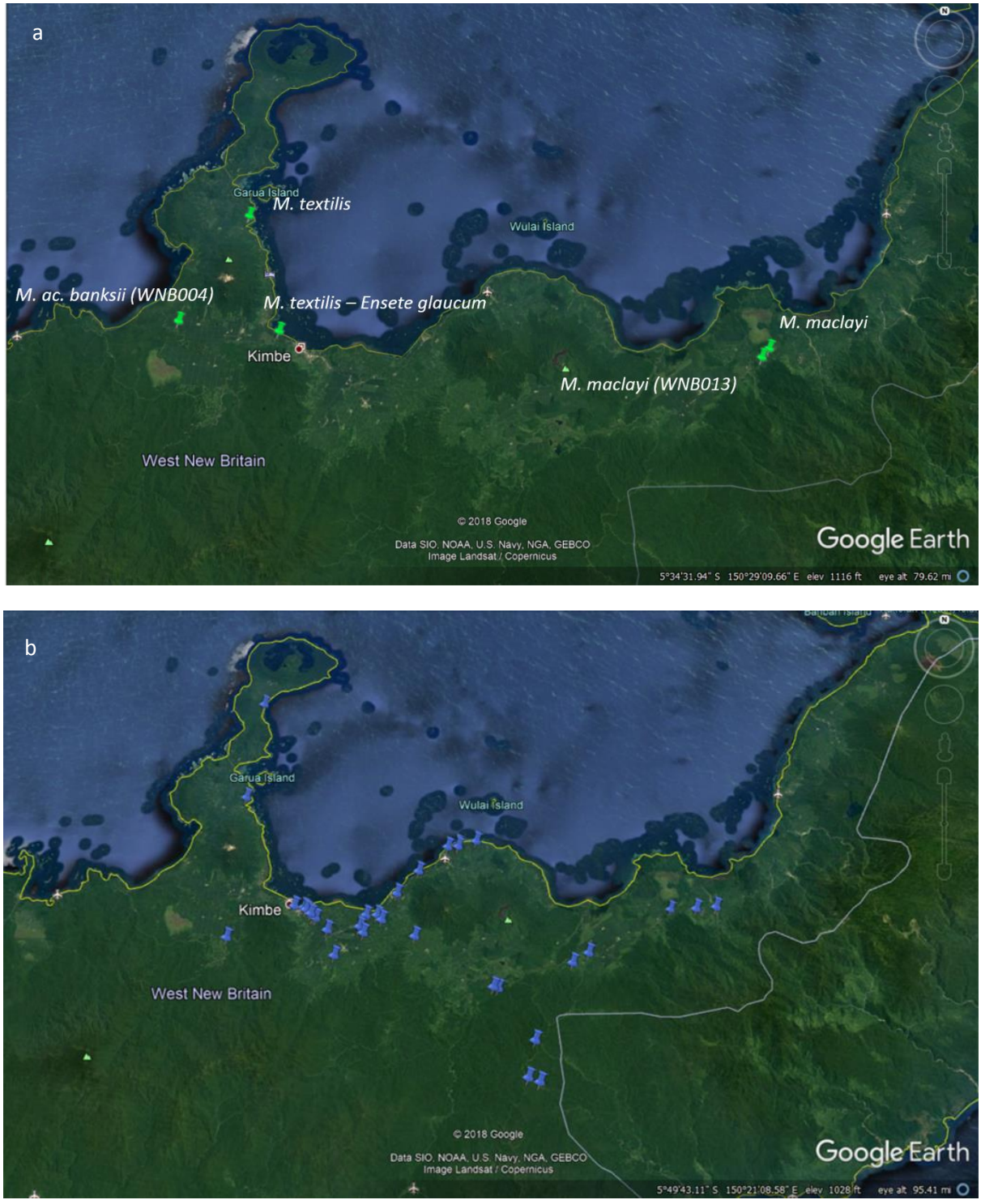

Figure 6: Maps of banana accessions collected in WNB. a. wild species observed and/or collected and b. cultivated accessions collected.

Wild bananas in WNB

No wild banana species growing in WNB have been strictly described in the literature. The only solid mention of some of them are in Lentfer (2003), an unpublished report, where a population of *M. acuminata* ssp. *banksii* growing in the Garu Oil Palm Plantation and some enset (*Ensete glaucum*) seemingly taken from the bush to be grown in home gardens are reported. Enset presence in the vicinity of Hoskins is also mentioned by Argent (1976). Lentfer (2003) also noted the exotic Abaca, *M. textilis,* in Tamare village where farmers were encouraged to grow it as a cash crop and could at the time obtain suckers from a store in Kimbe.

On the first day of exploration, we found a small population of *M. acuminata* ssp. *banksii* at the edge of the Garu Plantation where two main mats were surrounded by small seedlings growing between oil palm plants. We noted that the plant for which a male bud was still present had a red bud. We collected suckers from one of the mats (WNB004) for further conservation but did not collect fruits as they were not at a good stage to allow efficient seed conservation (Fig. 7). The local team reported that people were occasionally consuming this type of wild banana by boiling it and then getting rid of the seeds during consumption.

Figure 7: M. acuminata *ssp*. banksii *in Garu plantation. a. and b. bunch and fruit observed on the mat where a sucker was collected (WNB004); c. seedling growing between palm oil plants and d. purple male bud observed on a second mat.*

On the same day, we also recorded one patch of *M. textilis* growing on a roadside, in front of a lonely specimen of enset that may have been planted there (Fig. 8). On day 8 (Sunday 6th of October), a second mat of *M. textilis* was observed along the north road, at the level of a bridge, growing on the edge of a small river. As reported by Lentfer (2003) and confirmed by local team, *M. textilis* was introduced from East New Britain in the 1990's in the framework of a project aiming at producing fibres for rope production. The project was not successful, but the plants obviously escaped from cultivation.

Figure 8: a. and b. M. textilis *and c.* E. glaucum *growing on a roadside.*

A significant finding is the observation of two *M. maclayi* patches in WNB. *Musa maclayi* is a wild banana belonging to the section Callimusa (former Australimusa) and is presumed to be a close ancestor of the Fe'i bananas that exhibit bright orange and pro-vitamin A rich flesh. *Musa maclayi* is well known in PNG, where several sub-species were described on mainland PNG, in Bougainville and in New Ireland (Argent 1976). Argent (1976) in his review of wild bananas of PNG also mentioned as a personal communication from M. Bourke that a patch of *M. maclayi* existed in East New Britain "20 miles north of Pomio" and he assigned it tentatively to *M. maclayi* ssp. *maclayi* var. *namatani* Argent from the neighbouring island of New Ireland, specifying that he didn't see the plant. The main feature discriminating the two sub-species of *M. maclayi*, i.e. ssp. *maclayi* [with distribution on mainland PNG – Morobe province (var. *maclayi*), New Ireland (var. *namatani*) and Bougainville (var. *erecta*)] and ssp. *ailuluai* (restricted to Ferguson island) is the absence or presence of persistent bracts, respectively, on the bunch peduncle. What we observed in WNB had a bare peduncle and was no doubt part of *M. maclayi* ssp. *maclayi*. However, Argent (1976) discriminated *M. maclayi* ssp. *maclayi* var. *maclayi* from the two insular varieties by its bract behaviour, reflexing to c. 180° back against the peduncle with lateral margins becoming recurved. The variety *M. maclayi* ssp. *maclayi* var. *namatani* from New Ireland exhibits bracts reflexing c. 120°, not reaching the peduncle, and the lateral margins don't become revolute. Following Argent's (1976) descriptions of bract colour and behaviour and of leaf base shape, the plants observed in WNB seem to be closer to the description of *M. maclayi* ssp. *maclayi* var. *maclayi* (Fig. 9).

Figure 9: Musa maclayi *ssp.* maclayi *in WNB. a. patch along the road, b. bracts' behaviour and c. bunches with fruits at various maturation stages and leaf base shape.*

The first population of *M. maclayi* was found along the highway going east between Ubai and Kiava. We collected 3 bunches from this mat (Fig. 9 c). The seeds were later sent to the ITC for research and conservation. A second small population of *M. maclayi* was found growing near Cenaka high school. No bunch was at proper stage for collecting but we collected a sucker from this mat (WNB013).

Cultivated bananas of WNB

As expected for PNG, the majority of the collected accessions were diploids AA (46), of which 32 are used as cooking bananas only, 4 are eaten both cooked or raw as dessert and 10 are preferred as dessert bananas. We also collected 11 AAB bananas including 6 Maoli, notably one with a fully degenerating bud (WNB040 'Wan Gevi'), and one with no fruits at the time of collection but evoking an Iholena with leaves slightly variegated (WNB023 'Mesi Riringa') (Fig.10). Four Fe'i bananas were found but with probable duplicates, and we collected 3 ABB of known subgroups (two Kalapua variants and a dwarf Pisang Awak) and two AAAs. One accession was also classified as AS, WNB037 'Lakiso 2' and was resembling 'Kokor' [ITC0791/PNG123; ITC0914/PNG313) / 'Tonton Kepa' (ITC0822/PNG190)] (Fig.11). Finally, we collected 3 accessions of ornamental bananas with reddish leaves, namely WNB034 'Flower banana', WNB062 'Hilltop' and WNB067 'Purple banana', this last one being similar to AROB006 'Nono' (Fig. 12).

Figure 10: Accessions WNB040 'Wan Gevi' (AAB - Maoli) at the left and WNB023 'Mesi Riringa' (AAB – Iholena like) at the right.

Figure 11: WNB037 'Lakiso 2', an edible diploid with possible AS genomic composition.

Figure 12: Ornamental bananas with reddish leaves a. WNB034 'Flower banana', b. WNB062 'Hilltop' and c. WNB067 'Purple banana' similar to 'Nono' AROB006 (last photo not from the accession collected).

We took the opportunity of this collecting session to recollect a few accessions lost from the NARI Laloki collection over the years. When synonymy is suspected with known cultivars it is mentioned on table 1. It is the case notably of WNB038 'PK', which was named after chewing-gum due to its sticky sap, and is likely identical to the AAA from Bougainville AROB057 'Sepik' (Fig. 13 a.). We recollected the diploid AA 'Spiral' (ITC1206 – PNG010) as WNB017 'Gneing' which exhibited a very particular feature with a bunch composed of a single hand (Fig. 13 b and c). It also should be noted that the variegated AROB055 'Tambra' collected initially in the Autonomous Region of Bougainville, was likely recollected twice (WNB011 'Kiau Kiau white' and WNB029 'Mapalepa'). However, WNB011 was not fruiting at the time of collection so we cannot be sure for the moment that these two accessions are the same genotype (Fig. 14).

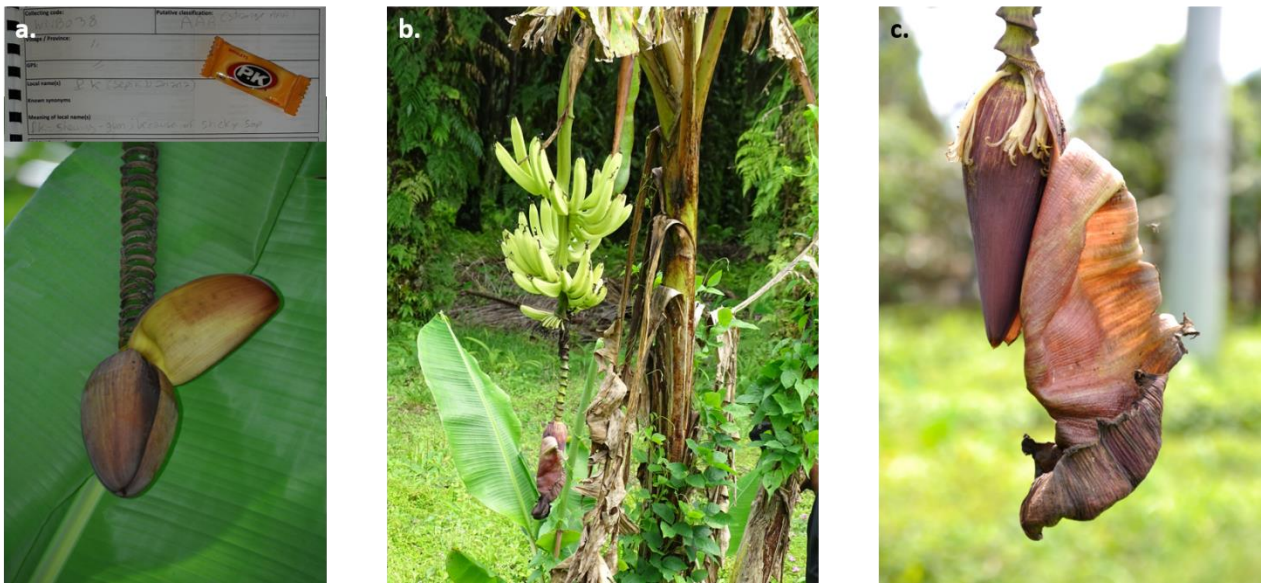

Figure 13: Accessions recollected a. WNB038 'PK' (likely AROB057 'Sepik') and WNB017 'Gneing' with b. bunch composed of a single hand and c. male flower with a single bract (likely ITC1206 / PNG010 'Spiral').

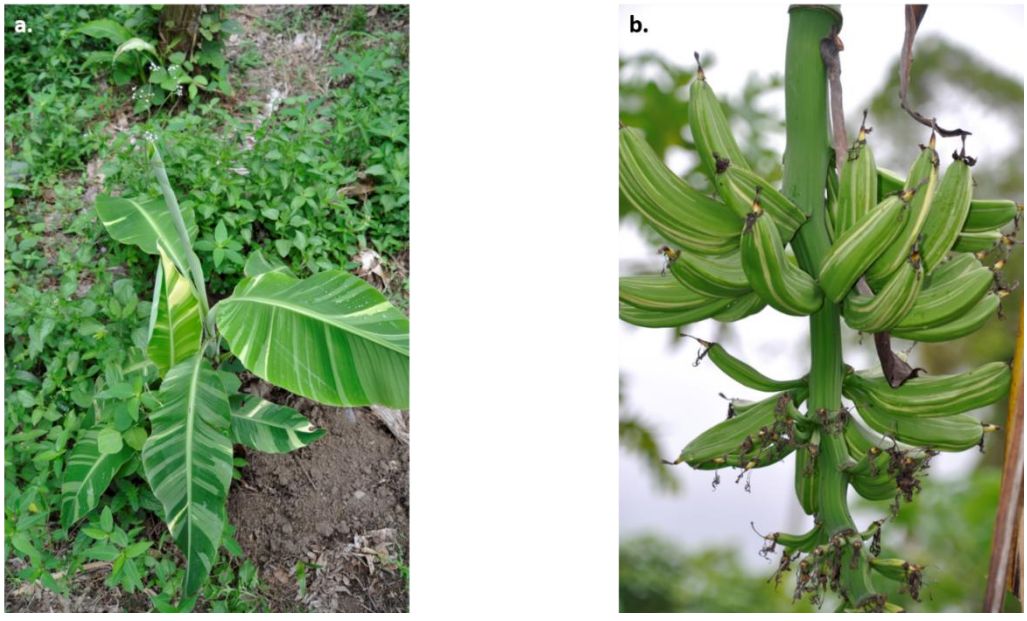

Figure 14: The two variegated edible accessions collected, a. WNB011 'Kiau Kiau white', not fruiting at the time of collection, and b. WNB029 'Mapalepa with variegated bananas. Both are probably the same as AROB055 'Tambra' (to be confirmed with molecular markers).

Within the newly collected accessions, there is a notable diploid AA exhibiting a long bunch and red fruits, WNB035 'Mostalulu red' (Fig.15 a). We also collected a pinkish AA, WNB039 'Valoka 1', and what seemed to be a redder variant of AROB035 'Talasea', WNB055 'Misis' (Fig. 15 b and c). We finally noted a diploid AA, with ploidy confirmed by flow cytometry analysis, named WNB0063 'Pagal' and exhibiting massive fruits resembling a pale AAB Plantain (Fig. 16). Documentation photos for all the collected accessions will be published in the upcoming catalogue (Sachter-Smith et al. *in prep.*).

Figure 15: a. WNB035 'Mostalulu red', b. WNB039 'Valoka 1' and c. WNB055 'Misis', likely a redder variant of AROB035 'Talasea'.

Figure 16: Diploid AA WNB063 'Pagal'. Full bunch (left) and cut fruit next to a fruit of M. acuminata ssp. banksii (collected in Madang district for another project).

Conclusion

The banana collecting mission to WNB was very successful. We described, collected and sampled new wild banana populations and we collected several new cultivated genotypes. The collecting method adopted since the collecting missions to Eastern Indonesia (Hermanto et al. 2014a, 2014b), where fresh cigar leaves are sent to the MGC for flow cytometry analysis and SSR genotyping, was again employed efficiently during the three collecting missions performed this year, Cook Islands (Sardos et

al. 2019a) and Samoa (Sardos et al. 2019b) being the two first ones. The flow cytometry analyses helped us propose accurate classifications for a few of the collected cultivars for which ploidy was not certain based on morphological assessment. The additional back-ups made with silica dried leaf samples will enable the genotyping of the accessions for which the fresh cigar leaves arrived rotten or were not collected. We expect the upcoming SSR genotyping results to help further refine the genomic composition and evolution of the many accessions collected. The results will be presented later in a scientific article on the model of what was published previously for the missions to Eastern Indonesia and to the Autonomous Region of Bougainville (Sutanto et al. 2016; Sardos et al. 2018).

Overall, this new banana collecting mission to Papua New Guinea showed that it is worthwhile to continue collecting banana genetic resources in this country. It also questioned the origin of this amazing diversity and suggests that somewhere, in this wide country, mechanisms must be in place that favour the creation of new banana diversity. Conservation efforts should also focus on protecting the practices that favour the creation, establishment and conservation of new genotypes.

Table 1: Collected accessions, dates and places of collection, names, classification, potential synonyms and ploidy as measured by flow cytometry. *names given by collecting team according to the place of collection.

Collecting date	Collecting place	Code	Nom	Genomic Composition	Subgroup	Potential synonyms	Ploidy
2/10/2019	Ismine	WNB001	Mau Banana	AAB	Silk-like	'Gamaha' (PNG192 - ITC1006)	3x
2/10/2019	Ismine	WNB002	Highlands banana	AA		-	no cigar leaf
2/10/2019	Ismine	WNB003	Gwambu	AA		-	Rotten sample
2/10/2019	Garu Plantation	WNB004	Wel banana	*M. acuminata*	ssp. *banksii*	-	2x
3/10/2019	Uasilau	WNB005	Lolu	Fe'i		-	2x
3/10/2019	Wainamasile	WNB006	Pougala 1	AA		-	no cigar leaf
3/10/2019	Wainamasile	WNB007	Pougala 2	AA		-	no cigar leaf
3/10/2019	Wainamasile	WNB008	Wore	Fe'i		-	2x
3/10/2019	Singalo	WNB009	Ain banana	AA		-	no cigar leaf
3/10/2019	Singalo	WNB010	Goroka	AA		-	no cigar leaf
3/10/2019	Singalo	WNB011	Kiau Kiau white	AA		'Tambra' (AROB055 - ITC1915)	2x
3/10/2019	Cenaka Highschool	WNB012	Oporusi	AA		-	2x
3/10/2019	Cenaka Highschool	WNB013	M. maclayi*	*M. maclayi*	ssp. *maclayi* var. *maclayi*	-	2x
3/10/2019	Ubai	WNB014	Ubai 1*	AAB		'Wambo' (PNG351 - ITC0944)	3x
3/10/2019	Ubai	WNB015	Ubai 2*	AA		'Pitu' (PNG102 - ITC0777) – 'Awondaeke' (PNG275 - ITC0884)	2x
3/10/2019	Buvusi	WNB016	Apap	Fe'i		-	2x
4/10/2019	Road to Ubai/Lavege (Lake Lalili)	WNB017	Gneing	AA		'Spiral' (PNG010-ITC1206)	2x
4/10/2019	Road to Ubai/Lavege (Lake Lalili)	WNB018	Long	AAA		'Mise'ehina' (PNG359 - ITC0952) - red 'Bukatawawe' (AROB009)	Rotten sample
4/10/2019	Road to Ubai/Lavege (Lake Lalili)	WNB019	Tuli	AA		-	no cigar leaf
4/10/2019	Ainbul	WNB020	Morobe banana	AA		-	2x
4/10/2019	Melnge	WNB021	Moloung	AA		-	no cigar leaf

4/10/2019	Melnge	WNB022	Sepik banana	AA or AAA		-	Rotten sample
4/10/2019	Melnge	WNB023	Mesi Riringa	AAB	Iholena-like	-	Rotten sample
4/10/2019	Mining junction	WNB024	Mining Junction 1*	AA		-	Rotten sample
4/10/2019	Mining junction	WNB025	Mining Junction 2*	AA		-	2x
4/10/2019	Mining junction	WNB026	Tepori won	AA		-	2x
4/10/2019	Mining junction	WNB027	Mining Junction 3*	AA		-	no cigar leaf
4/10/2019	Mining junction	WNB028	Moking	AA		-	2x
4/10/2019	Mining junction	WNB029	Mapalepa	AA		‘Tambra’ (AROB055 - ITC1915)	2x
4/10/2019	Mining junction	WNB030	Lop	AA		-	2x
4/10/2019	Mining junction	WNB031	Mining Junction 4*	AA		-	no cigar leaf
4/10/2019	Balabolo	WNB032	Balabolo*	AAB	Iholena-like ('Mamae Upolu' like)	-	no cigar leaf
4/10/2019	Balabolo	WNB033	Kapiac banana	Fe'i		‘Apap’ (WNB016)	2x
5/10/2019	Kasi	WNB034	Flower banana	AA?		‘Glenda's Red’ (AROB041 - ITC1909)	Rotten sample
5/10/2019	Pora Pora	WNB035	Mostalulu red	AA		-	2x
5/10/2019	Lakiso	WNB036	Lakiso 1*	AA		-	2x
5/10/2019	Lakiso	WNB037	Lakiso 2*	AS	Kokor-like	‘Kokor’ (PNG313 - ITC0914; PNG123 - ITC0791), ‘Tonton kepa’ (PNG190 -ITC0822)	2x
5/10/2019	Lakiso	WNB038	PK	AAA		‘Sepik’ (AROB057)	3x
5/10/2019	Valoka	WNB039	Valoka 1*	AA		-	2x
5/10/2019	Valoka	WNB040	Wan Gevi	AAB	Maoli - Horn type	-	3x
5/10/2019	Valoka	WNB041	Valoka 2*	AA		-	2x
5/10/2019	Valoka	WNB042	Maia	AA		‘Popondetta’ (AROB028), ‘Abau’-like (AROB021)	Rotten sample
5/10/2019	Kwalakesi	WNB043	Lavugi	AAB	Maoli	-	no cigar leaf
6/10/2019	Wangore	WNB044	Lae banana	AA		-	2x

6/10/2019	Wangore	WNB045	Tamaneburo	AA		-	2x
6/10/2019	Wangore	WNB046	Green sausage banana	AA		green variant of 'Sausage banana' (AROB061 - ITC1922)	no cigar leaf
6/10/2019	Bola	WNB047	Bola 1*	AA		-	Rotten sample
6/10/2019	Bola	WNB048	Bola 2*	AA		-	no cigar leaf
6/10/2019	Bola	WNB049	Buka kiaukiau	AAB		-	3x
6/10/2019	Bola	WNB050	Tui	AA		-	2x
6/10/2019	Bola	WNB051	Mirihe	AA		-	no cigar leaf
6/10/2019	Bola	WNB052	Kovole	AA		-	Rotten sample
7/10/2019	Kapore Station	WNB053	Dwarf Yawa	ABB	Pisang Awak	-	no cigar leaf
7/10/2019	Kapore Station	WNB054	Mea PK long	AA		-	2x
7/10/2019	Kapore Station	WNB055	Misis	AA		Pink type of 'Talasea' (AROB035 - ITC1913)	Rotten sample
7/10/2019	Kapore Station	WNB056	Puri Kansa	AA		-	2x
7/10/2019	Kapore Section 5	WNB057	Kapore section 5*	AA		-	2x
7/10/2019	Kapore Section 5	WNB058	White Tukuru	ABB	Kalapua	-	Rotten sample
7/10/2019	Sarakolok Section 6	WNB059	Sarakolok 1*	AA		-	no cigar leaf
7/10/2019	Sarakolok Section 6	WNB060	Sarakolok 2*	AA		-	no cigar leaf
7/10/2019	Aling	WNB061	Komo	AAB	Maoli or like	-	Rotten sample
9/10/2019	Morokea	WNB062	Hilltop	AA?		-	2x
9/10/2019	Kimbe	WNB063	Pagal	AA		-	2x
9/10/2019	Tagala	WNB064	Sanap	AA		-	2x
9/10/2019	Tagala	WNB065	Mea	AA		-	2x
9/10/2019	Kimbe (Genesis Haven GusteHouse)	WNB066	Genesis Haven*	AA		-	Rotten sample
9/10/2019	Kimbe (Genesis Haven GusteHouse)	WNB067	Purple banana	AA?		'Nono' (AROB006)	no cigar leaf
10/10/2019	Buluma	WNB068	Shorty banana	AAB	Maoli	-	3x
10/10/2019	Kumbango Mill Compound	WNB069	Butu	AAB	Maoli	-	no cigar leaf
10/10/2019	Ruango Block	WNB070	RB*	AAB	Maoli	-	3x
10/10/2019	Kapore Section 2	WNB071	Tukuru round	ABB	Kalapua	-	3x

10/10/2019	Kapore Section 2	WNB072	Kapore section 2*	AA	Sucrier	-	2x

Table 2: Collected accessions, names, classification, uses, meaning of the names and GPS coordinates. *names given by collecting team according to the place of collection.

Code	Name	Genomic Composition	Subgroup	Uses	Meaning of name	Lat.	Long.
WNB001	Mau Banana	AAB	Silk-like	Dessert	Ripe banana	-5.6104	150.0381
WNB002	Highlands banana	AA		-	Banana from the Highlands	-5.6104	150.0381
WNB003	Gwambu	AA		-	no meaning, just a name	-5.6104	150.0381
WNB004	Wel banana	M. acuminata	ssp. banksii	Cooked (when ripe)	Wild banana	-5.5180	149.9603
WNB005	Lolu	Fe'i		Both	Blood (from the color of the sap)	-5.5817	150.8854
WNB006	Pougala 1	AA		Cooked (boiled)	Named like this because of high value	-5.5497	150.8776
WNB007	Pougala 2	AA		Dessert	Named like this because of high value	-5.5497	150.8776
WNB008	Wore	Fe'i		Both	yellow (referring to the flesh colour)	-5.5497	150.8776
WNB009	Ain banana	AA		Cooking	Iron banana (referring to its very hard flesh)	-5.5537	150.8427
WNB010	Goroka	AA		Cooking	From Goroka	-5.5537	150.8427
WNB011	Kiau Kiau white	AA		Cooking		-5.5537	150.8427
WNB012	Oporusi	AA		Cooking	yellow	-5.5520	150.8034
WNB013	M. maclayi*	M. maclayi		Not consumed	NA	-5.5520	150.8034
WNB014	Ubai 1*	AAB		Cooking	NA	-5.6340	150.6542
WNB015	Ubai 2*	AA		Cooking	NA	-5.6513	150.6265
WNB016	Apap	Fe'i		Both	Upright	-5.6073	150.3586
WNB017	Gneing	AA		Dessert preferred	Spiral	-5.6938	150.4927
WNB018	Long	AAA		Both	Long (from tall plant)	-5.6938	150.4927
WNB019	Tuli	AA		Cooking		-5.6961	150.5007
WNB020	Morobe banana	AA		Cooking	Banana from Morobe Province	-5.8428	150.5495
WNB021	Moloung	AA		Dessert	no meaning, just a name	-5.8496	150.5681

WNB022	Sepik banana	AA or AAA		Cooking (roasted when ripe)	Banana from Sepik	-5.8496	150.5681
WNB023	Mesi Riringa	AAB	Iholena-like	Both (roasted when cooked)	Colour of the fur of the tree-kangaroo	-5.8496	150.5681
WNB024	Mining Junction 1*	AA		Both	NA	-5.7827	150.5616
WNB025	Mining Junction 2*	AA		Dessert	NA	-5.7827	150.5616
WNB026	Tepori won	AA		Cooking	no meaning, just a name	-5.7827	150.5616
WNB027	Mining Junction 3*	AA		Dessert	NA	-5.7827	150.5616
WNB028	Moking	AA		Cooking	Smoking (because cooked on the fire)	-5.7827	150.5616
WNB029	Mapalepa	AA		Cooking	no meaning, just a name	-5.7827	150.5616
WNB030	Lop	AA		Cooking (roasted)	Seed of the Taun tree	-5.7827	150.5616
WNB031	Mining Junction 4*	AA		Both	NA	-5.7827	150.5616
WNB032	Balabolo*	AAB	Iholena-like ('Mamae Upolu' like)	Both	NA	-5.5692	150.2924
WNB033	Kapiac banana	Fe'i		Both	Breadfruit banana (from its taste reminding breadfruit)	-5.5776	150.3008
WNB034	Flower banana	AA?		Ornemental	Flower banana	-5.4416	150.4114
WNB035	Mostalulu red	AA		Dessert	NA	-5.4365	150.4289
WNB036	Lakiso 1*	AA		Cooking	NA	-5.4400	150.4292
WNB037	Lakiso 2*	AS	Kokor-like	Cooking (Roasted)	NA	-5.4408	150.4300
WNB038	PK	AAA		Cooking	PK= chewing-gum (from its sticky sap)	-5.4408	150.4300
WNB039	Valoka 1*	AA		Cooking	NA	-5.4304	150.4615
WNB040	Wan Gevi	AAB	Maoli - Horn type	Cooking	One hand	-5.4304	150.4615
WNB041	Valoka 2*	AA		Cooking	NA	-5.4304	150.4615
WNB042	Maia	AA		Cooking	no meaning, just a name	-5.4304	150.4615
WNB043	Lavugi	AAB	Maoli	Both	NA	-5.4882	150.3616
WNB044	Lae banana	AA		Cooking	Banana from Lae	-5.1534	150.0602
WNB045	Tamaneburo	AA		Dessert	NA	-5.1534	150.0602

WNB046	Green sausage banana	AA		Dessert	Green version of sausage banana (from fruit shape and colour)	-5.1534	150.0602
WNB047	Bola 1*	AA		Cooking	NA	-5.3473	150.0460
WNB048	Bola 2*	AA		Cooking	NA	-5.3473	150.0460
WNB049	Buka kiaukiau	AAB		Cooking	Kiaukiau from Buka	-5.3473	150.0460
WNB050	Tui	AA		Cooking	no meaning, just a name	-5.3473	150.0460
WNB051	Mirihe	AA		Dessert	NA	-5.3473	150.0460
WNB052	Kovole	AA		Cooking	NA	-5.3473	150.0460
WNB053	Dwarf Yawa	ABB	Pisang Awak	Dessert	Dwarf Pisang Awak	-5.5694	150.2733
WNB054	Mea PK long	AA		Cooking	Mea= its name in Talasea, meaning 'Wet', PK=chewing-gum (from its sticky flesh)	-5.5694	150.2733
WNB055	Misis	AA		Cooking	Missis (from white skin of the fruits turning reddish)	-5.5694	150.2733
WNB056	Puri Kansa	AA		Cooking	Puri = Banana ; Kansa= its name	-5.5694	150.2733
WNB057	Kapore section 5*	AA		Cooking	NA	-5.6012	150.2704
WNB058	White Tukuru	ABB	Kalapua	Cooking (roasted)	White Kalapua	-5.6012	150.2704
WNB059	Sarakolok 1*	AA		Cooking	NA	-5.6414	150.2234
WNB060	Sarakolok 2*	AA		Cooking	NA	-5.6414	150.2234
WNB061	Komo	AAB	Maoli or like	Cooking	NA	-5.5747	150.1874
WNB062	Hilltop	AA?		Ornemental	Top of the hill (where the house was)	-5.5598	150.1696
WNB063	Pagal	AA		Cooking	no meaning, just a name	-5.5533	150.1491
WNB064	Sanap	AA		Dessert	"Stand up" from the shape of the fruits' tips that remind woman's breast)	-5.5561	150.1660
WNB065	Mea	AA		Cooking	Wet	-5.5561	150.1660
WNB066	Genesis Haven*	AA		Cooking	NA	-5.5732	150.1826
WNB067	Purple banana	AA?		Ornemental	Purple banana	-5.5732	150.1826
WNB068	Shorty banana	AAB	Maoli	Cooking (when ripe)	Short banana (short fruits)	-5.5296	150.3249
WNB069	Butu	AAB	Maoli	Cooking	no meaning, just a name	-5.5963	150.2087
WNB070	RB*	AAB	Maoli	Cooking	NA	-5.5670	150.1784
WNB071	Tukuru round	ABB	Kalapua	Cooking	Round Kalapua	-5.5913	150.2643
WNB072	Kapore section 2*	AA	Sucrier	Both	NA	-5.5900	150.2634

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References:

Argent G. 1976. *The wild bananas of Papua New Guinea*. Notes from the Royal Botanic Garden, Edinburgh 35(1):77-114.

Arnaud E. and Horry J.P. (eds.). 1997. Musalogue: a catalogue of Musa germplasm. Papua New Guinea collecting missions, 1988-1989. INIBAP, Montpellier, France. 165p.

Elahi K. Q. I. and P.S. Michael. 2017. *Oil palm plantation, smallholders and land settlement schemes in Papua New Guinea*. Contemporary PNG Studies: DWU Research Journal Vol. 26.

Hermanto, C., Sutanto, A., HS, E., Riska,, Alfons, , Hosang, E., Daniells, J. and Hilman, Y. 2014a. Triangle Banana Exploration Report, North Sulawesi and North Maluku, Indonesia. 6-24 October 2012. Bioversity International, Montpellier, France. 14p.

Hermanto, C., HS, E., Nasution, F., Riska,, Malia, E., Nofriarjasri,, Daniells, J., Sutanto, A. and Hilman, Y. 2014b. Triangle Banana Exploration Report, Central Maluku and Lesser Sunda Islands, Indonesia. 16 February - 6 March 2013. Bioversity International, Montpellier, France. 18p.

Lentfer C. J. 2003. *Tracing antiquity of banana cultivation in Papua New Guinea: Report on collection of modern reference material from Papua New Guinea in 2002*. Unpublished report prepared for the Pacific Biological Foundation, Sydney, NSW, Australia.

Sachter-Smith G. L., Sardos J., Paofa J., Togabalaguguwa E. and Roux N. Bananas of West New Britain: a catalogue of banana diversity seen in the province of West New Britain, Papua New Guinea. Bioversity International, Montpellier, France. *In prep.*

Sardos J., Christelová P., Cizková J., Paofa J., Sachter-Smith G., Janssens S.B., Rauka G., Ruas M., Daniells J.W., Dolezel J. and Roux N. 2018. Collection of new diversity of wild and cultivated bananas (Musa spp.) in the Autonomous Region of Bougainville, Papua New Guinea. Genetic Resources and Crop Evolution 65(8):2267–2286. http://dx.doi.org/10.1007/s10722-018-0690-x

Sardos J., Sachter-Smith G., Ghanem M., Hribova E., Van den Houwe I., Roux N. and Wigmore W. 2019a. Report of the Banana Collecting Mission to Rarotonga and Aitutaki, Cook Islands 20 May to 31 May, 2019a. Bioversity International, Montpellier, France. 24p.

Sardos J., Sachter-Smith G., Shandil A., Van den Houwe I., Hribova E., Matalavea P., Vaai A., Iosefa T., Hunter D. T. and Roux N. 2019b. Bioversity International, Montpellier, France. 21p.

Sutanto A., Edison H.S., Nasution F., Hermanto C., Cizková J., Hribova E., Dolezel J., Roux N., Horry J.P., Daniells J.W. and De Langhe E.A.L. 2016. Collecting banana diversity in eastern Indonesia. p.19-26. In: Proceedings of IX International Symposium on Banana: ISHS-ProMusa Symposium on Unravelling the Banana's Genomic Potential, Brisbane, Australia 17-22 August 2014. Acta Horticulturae 1114. ISHS, Leuven, Belgium. http://dx.doi.org/10.17660/ActaHortic.2016.1114.3